



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

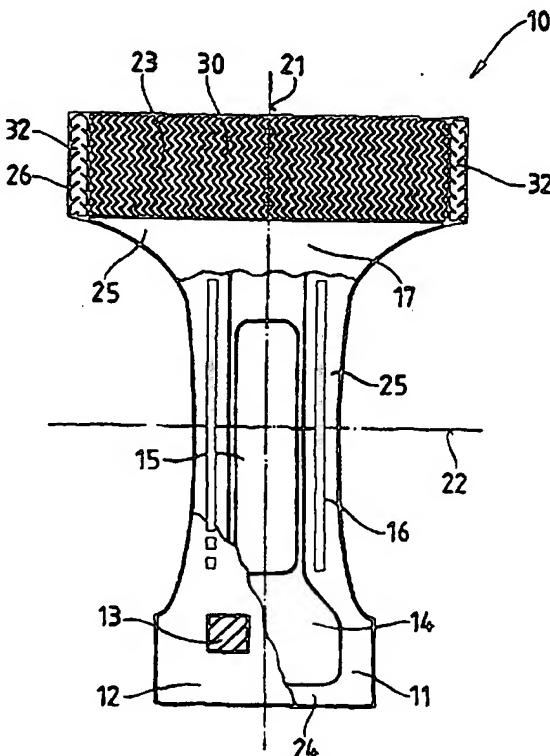
(51) International Patent Classification ⁵ :	A1	(11) International Publication Number:	WO 95/02383
A61F 13/15		(43) International Publication Date:	26 January 1995 (26.01.95)

(21) International Application Number:	PCT/US94/07920	(81) Designated States: AM, AU, BB, BG, BR, BY, CA, CN, CZ, FI, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LV, MD, MG, MN, MW, NO, NZ, PL, RO, RU, SD, SI, SK, TJ, TT, UA, US, UZ, VN, OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).
(22) International Filing Date:	15 July 1994 (15.07.94)	Published
(30) Priority Data:	93202087.8 16 July 1993 (16.07.93) EP	With international search report.
	(34) Countries for which the regional or international application was filed:	BE et al.
(71) Applicant (for all designated States except US): THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US).		
(72) Inventor; and		
(75) Inventor/Applicant (for US only): SCHMITZ, Christoph, Johann [DE/DE]; Dr.-Lieser-Strasse 2, D-53881 Euskirchen (DE).		
(74) Agents: REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217 (US).		

(54) Title: PANT STYLE DIAPERS

(57) Abstract

The present invention relates to disposable absorbent articles or undergarments (10). The disposable articles (10) are essentially designed as conventional disposable diapers, however, they are provided with an endless circular waistband (30, 17) at one longitudinal end (23) of the article (10). The disposable article (10) is applied to a wearer by slipping the endless waistband (30, 17) onto the hips such that the absorbent part (17) of the article (10) is in front or behind the wearer (1), and can be pulled between the legs (2) to the opposing side and be attached to the endless waistband (30, 17).



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

PANT STYLE DIAPERS**Field of the invention**

The present invention relates to disposable absorbent articles or undergarments. The disposable articles are essentially designed as conventional disposable diapers however they are provided with an endless circular waistband at one longitudinal end of the article. The disposable article is applied to a wearer by slipping the endless waistband onto the hips such that the absorbent part of the article is in front or behind the wearer and can be pulled between the legs to the opposing side and be attached to the endless waistband.

Background of the invention

Undergarments and disposable diapers are well established products. The prior art on belts or bands in connection with disposable diapers is also very crowded. For example US 849725 and US 3890973 disclose absorbent garments having two belts which in use form an endless circular belt together with the front and back longitudinal end of the absorbent product. In

its flat, stretched out shape this product has one part of an elastic belt laterally extending from each side of the garment.

US 3618608 and 4728326 as well as FR 2586558 disclose diapers having a belt adjacent or near one of the waist margins. The belt laterally extends to either side of the diaper and is attached to the opposite waist margin. US 4158906 discloses a diaper such which fastens opposing sides of the diaper. The length of the diaper which is adjustable and is independent from the rest of the diaper. US 4315508 discloses garments having two elastic pieces to form a removable elastic belt. One piece on each side connects the front and the rear waist margins of the garment. FR 2612770 discloses disposable pants having integral straps which encircle the waist of the wearer and are secured by fasteners.

EP-A-409307 or PCT 9007160 both disclose attachable elastic waist belts and EP-A-352208 and DE-A-3238450 disclose disposable diapers having a detachable elastic waist belt which allows them to be used like pull-up pants or regular undergarments. US 4205679 also discloses disposable undergarments which can be slipped on like regular underpants having an elastic waist band. A leak proof underpants carrying a disposable catamenial is known from US 4690681 which allows the wearer to put the catamenial on in the same fashion as a regular underpants. A similar construction used as a child's training pants is known from US 4646362 also having an elasticized waist band and elasticized leg openings.

One basic problem with undergarment or underpants type disposable garments, is that in order to use them the wearer has to slip them on over the legs which in particular for young children can be difficult due to their activity level. Also they often do not wish to wear such disposable absorbent articles and physically reject being dressed with them. Therefore it would be easier to just slip a belt over the head or from below over the legs onto the hip of a child rather than

trying to put both legs into separated leg opening of an undergarment.

A problem with flat structured disposable articles for example diapers or children's training pants is that in order to apply them onto the wearer the wearer has to be in a lying position and allow tight fitting. Otherwise the functionality of the absorbent article will suffer.

Therefore it is an objective of the present invention to provide a disposable absorbent article which combines the benefits of a flat structured closable absorbent article while not requiring the wearer to lie down and accept manipulating of the article while the wearer has to hold still.

Further in its particular designs this invention also allows a functional decoupling between the absorbent part of the article and the elastic waist band. In particular the draw-back of providing elasticity in the back of a disposable undergarment typically used in the prior art the present invention allows to provide elasticity where it is needed most i.e. around the belly and the hips of a wearer.

Further features and advantages will become evident from the detailed description of the invention and the drawings described below.

Brief description of the invention

The present invention relates to a disposable absorbent article having a longitudinal direction which defines a first and a second longitudinal end region and a lateral direction which defines lateral side regions. The disposable absorbent article will further comprise an oblong structure which is disposed in lateral direction in the first longitudinal end region of the disposable article. The oblong structure extends into both lateral side regions of the article and is joined to the article in each lateral side region so as to form together

with the longitudinal end region an endless circular waist band. This endless circular waist band comprises an elastic region to provide at least a tangential elasticity to the endless circular waist band such that it tightens itself around the hip of the wearer.

It is particularly preferred if the oblong structure is joined in the lateral side regions to the article such that an attachment is formed in longitudinal direction and coincides with the lateral outside edge of the article.

Even more preferred the oblong substrate is disposed in the longitudinal first end region of the article. Typically and preferred the first longitudinal end region is the rear end region of the disposable article. This means that during use on a wearer that first longitudinal end region is in the back of the wearer.

The elastic region in the endless circular waist band is preferably provided by the oblong substrate which in particular can be an elastic laminate of non-woven fibrous substrates.

In use after having placed the waist band around the waist of the wearer the second longitudinal end region is pulled between the legs of the wearer and joined to the oblong substrate so as to form an undergarment on the body of the wearer. Joining the second longitudinal end region to the oblong substrate should preferably be done by a releasable closure system like for example an adhesive tape or a mechanical closure means in particular of the hook/loop type (e.g. VELCRO™). The joining of the second longitudinal end region to the oblong substrate can also be in such a way that the second longitudinal end region is pulled between the legs of the wearer and through the circular waist band such that the elasticity of the waist band holds the second longitudinal end region pressed on the wearer and is thereby joined with or without particular attachment features to the second longitudinal end region. This may

preferable be accomplished in combination with a releasable closure system as indicated above.

Brief description of the drawings

Figure 1 is a plan view of a preferred embodiment of the present invention.

Figure 2 is a perspective view of an alternative embodiment of the present invention.

Figure 3 is a plan view of the disposable absorbent article in yet another alternative embodiment of the present invention when used by a wearer.

Detailed description of the invention

In the following reference will be made to the preferred embodiments of the present invention as shown in Figures 1-3. The present invention is however not limited to the preferred embodiments but defined by the claims following this description.

The term "absorbent article" in the following description refers to absorbent articles including adult incontinence products, female hygiene pads or catamenials, baby diapers and children's training pants.

The term "elastic" refers to a stretchable and self-retractive material characteristic found in natural and artificial rubbers, elastomers and polymers.

Figure 1 shows a preferred embodiment of a disposable absorbent article, namely a training diaper (10). The training diaper (10) has a longitudinal direction (21) defining a first longitudinal end region (23) and a second longitudinal end region (24). It also has a lateral direction (22) defining the lateral side regions (25).

The disposable absorbent training pant (10) typically is structured like a regular disposable diaper portion (17). Diaper portion (17) comprises a top sheet (12) a backsheet (11) and an absorbent core (14) together with an additional core patch (15). In the figures preferred embodiments having single (figure 1) or multiple (figure 2) straight or shaped leg elastics (16) are shown.

In its first longitudinal end region the disposable absorbent article comprises an oblong substrate (30) which is extending into both lateral side regions (25). The oblong structure (30) is joined to the training diaper (10) at the lateral side edges (25) as shown in the figures. It is joined by a bond (32) extending a short distance in lateral direction towards the longitudinal axis (21). Depending on the bond strength of the attachment the bond (32) typically has a lateral extension of 3 mm to 30 mm, preferably 5 mm to 15 mm. It is typically as long in longitudinal direction as the oblong substrate (30). The oblong substrate (30) together with the diaper (17) forms an endless circular waste band in the first longitudinal end region (23). The endless circular waste band formed by the oblong substrate in the first longitudinal end region comprises an elastic region providing at least tangential elasticity to the circular waste band. In the figures this elastic region is shown as part of the oblong substrate (30). In Figure 1 and 2 the oblong substrate (30) and the elastic region of the endless circular waste band are coextensive while in Figure 3 only a central part of the oblong substrate (30) is elastic. The elastic region can however also be part of the absorbent diapers portion forming the other part of the endless circular waste band. As can be seen from figure 3 the preferred construction of the disposable absorbent article of the present invention is worn such that the first longitudinal end region (23) is in the rear of the wearer (1) while the second longitudinal end region (24) after being pulled between the legs of the wearer (1) is joined to the oblong substrate (30) in the front of the wearer (1).

In order to fit the disposable article (10) onto a wearer (1) as shown in figure 3 several ways to join the oblong substrate (30) and the second longitudinal end region (24) to each other can be employed. It is preferred that releasable cooperating closure means are used, for example adhesive tapes on the oblong substrate or in the second longitudinal end region of the diaper portion (17) can be joined to the respective countersurfaces. Alternatively and preferably mechanical cooperating closure means in particular hook/loop entanglement type systems can be used.

A particularly preferred design is shown in figure 2 and 3 where hook patch (13) cooperating with loops (not shown in the figures) are disposed on the outside of the backsheet (11) of the training diaper. The endless circular waste band is slipped over the legs and hip of a wearer (1) as shown in figure 3 and the second longitudinal end region is pulled between the legs of the wearer and through the inside of the endless circular waste band such that the hook patches (13) are covered by the oblong substrate (30). The oblong substrate (30), in this case preferably on its inside, has a soft feeling compliant loop material providing the counter mechanical closure system surface for the hook patches (13). The opposite type of closure is indicated in figure 1 where hook patches (13) are disposed on the topsheet of the training diaper (10) such that when used according to the above described procedure they have to entangle with the outside of the oblong substrate (30) and lack the benefit of being tightened addionnaly by the elastic circular tangential force of the endless circular waste band against the wearer (1).

It will be apparent for those skilled in the art that many combinations of materials and design modification are possible when using the beneficial principle of the present invention to combine a flat disposable absorbent article with an elastic endless circular waste band. In the following description materials useful in providing disposable absorbent articles

according to the invention, especially training diapers are summarized by way of non-limiting examples.

The absorbent core (14) as well as the optional additional core patch (15) may be any absorbent means which is generally compressible, conformable non-irritating to the wearer's skin and capable of absorbing and retaining liquid such as urine and other certain body exudates. The absorbent core may be manufactured in a wide variety of sizes and shapes and from a wide variety of liquid absorbent materials commonly used in diapers and other disposable absorbent articles such as comminuted woodpulp, generally referred to as airfelt, craped cellulose wadding, meltblown polymers including coformed, crosslinked cellulose fibres, tissues including tissue wraps and tissue laminates, absorbent foams, absorbent sponges, super absorbent polymers, absorbent gelling materials or any other equivalent materials or combination of materials. Also the configuration and construction of the absorbent core may be varied. For example the absorbent material may have varying caliper zones, a hydrophilic gradient, a super absorbent gradient, lower average density and lower average basis weight acquisition zones. It also may comprise one or more layers or substrates as shown in figure 1. The total absorbent capacity of the absorbent article should be compatible with design exudate loading and the intended use of the absorbent article.

Also the size and shape of the absorbent core should be varied to accommodate the expected wearer's ranging from infants to adults. Preferred absorbent core designs have been disclosed in US patents 4,610,678; 4,673,402; 4,888,231; 4,834,735; 4,685,915; 4,781,710; 4,600,458. The preferred absorbent core design provides a crosslinked cellulose patch (15) essentially without super absorbent on top of a mixture of airfelt plus super absorbent polymer and comprising more than 30% super absorbent polymer in the absorbent core (14) as described in EP-A-512010.

The backsheet is impervious to liquids (e.g. urine) and can be provided as a single sheet or as a laminate of two or more layers. The liquid imperviousness of the backsheet can for example be provided by an impervious layer which is preferably manufactured from a thin plastic film, preferably a thermoplastic film, although other flexible liquid impervious materials may be used. Whether the backsheet consists of a single or several layers, it should be flexible. As used herein, the term "flexible" refers to materials which are compliant and which will readily conform to the general shape and contours of the human body. The backsheet prevents the exudates absorbed and contained in the absorbent core from soiling articles which contact the absorbent article such as clothes, bedsheets and undergarments. The backsheet may thus comprise polymeric films such as thermoplastic films of polyethylene or polypropylene, or composite materials such as a film-coated nonwoven material. For economic, aesthetic, and ecological reasons, the part of the backsheet (30) providing liquid imperviousness preferably has an average nominal caliper, i.e. calculated caliper, of less than about 0.051 mm, more preferably a calculated caliper of from 0.01 mm to 0.036 mm.

If provided as a multilayered laminate the backsheet preferably comprises a flexible polyethylene film. As used herein the term "polyethylene" film refers to films which are essentially made of polyethylene, however, it is understood that polyethylene film will contain a variety of additives to provide characteristics like opacity, strength requirements, color or any other desired characteristic that can be achieved through adding minor amounts of other substances than polyethylene into the films. The total amount of additives should be less than 45%, preferably less than 15%, by weight of film materials. Exemplary films for use in backsheets are manufactured by Tredegar Industries, Inc. of Terre Haute, Indiana USA or BP-Chemical PlasTec Rotbuchenstrasse 1, D - 8000 MUNCHEN, Germany.

If the backsheet is provided as a multilayered laminate the outside surface preferably is provide by a layer of material as described below for topsheets. Alternatively the backsheet can also be textured to provide a fibrous outside surface for more clothlike appearance. Further the backsheet may also permit vapors to escape from the absorbent core while still preventing exudates from passing through as described, for example, in US patent 4,681,793. The backsheet may also be biodegradable such as the film disclosed in US Patent Application Serial NO 07/721,066 entitled "Disposable Absorbent Articles with Biodegradable Backsheets".

The size of the backsheet is dictated by the size of the absorbent core and the exact absorbent article design selected. In the preferred embodiment, the backsheet has a modified hourglass shape extending beyond the absorbent core a minimum distance of at least 1.3 cm for adult incontinent briefs around the entire periphery.

The topsheet of the present invention is compliant, soft feeling and non-irritating to the wearer's skin. Further, the topsheet is liquid pervious permitting liquids (e.g. urine) to readily penetrate through its thickness. A suitable topsheet may be manufactured from a wide range of materials, such as porous foams, reticulated foams, apertured films; or woven or nonwoven webs of natural fibers (e.g. wood or cotton fibers), synthetic fibers (e.g. polyester or polypropylene fibers) or from a combination of natural and synthetic fibers. Preferably, it is made of a material that isolates the wearer's skin from liquids retained in the absorbent core.

There are a number of manufacturing techniques which may be used to manufacture the topsheet. For example, the topsheet comprises a nonwoven web of fibers. When the topsheet comprises a nonwoven web, the web may be spunbonded, carded, wet-laid, meltblown hydroentangled, hydroformed, combinations of the above, or the like. An exemplary topsheet is carded and thermally bonded by means well known to those skilled in the

fabric art and comprises staple length polypropylene fibers having a denier of about 2.2 and a basis weight from about 15 to about 30 grams per square meter. As used herein the term "staple length fibers" refers to those fibers having a length of at least about 16 mm. A suitable topsheet is manufactured for example by Veratec, Inc. a Division of International paper Company, of Walpole, Massachusetts under the designation P-8. A topsheet particularly preferred for incontinent briefs of the present invention, comprises a formed thermoplastic film such as that described in US Patent 3,929,135 entitled " Absorptive Substrate Having tapered Capillaries".

The topsheet and the backsheet are joined together in any suitable manner as is well known in the diaper manufacturing art. As used herein, the term "joined" encompasses configurations whereby the topsheet is directly joined to the backsheet by affixing the topsheet directly to the backsheet, and configurations whereby the topsheet is indirectly joined to the backsheet by affixing the topsheet to intermediate members (e.g. absorbent core) which in turn are affixed to the backsheet. In a preferred embodiment, the topsheet and the backsheet are joined directly to each other in the diaper periphery by a flap attachment means such as an adhesive or any other attachment means as is known in the art and indirectly joined in the area coextensive with the absorbent core. In general, the same means as the flap attachment means that affixes the topsheet to the backsheet can also be used as a core attachment means that affixes the absorbent core to the backsheet. Thus, for example, a uniform continuos layer of adhesive, a patterned layer of adhesive, an array of separate lines, spirals, or spots of adhesive such as a network of adhesive filaments such as shown in US Patent 4,573,986, may be used.

The oblong substrate forming part of the endless circular waste band is preferably made such that it has a smooth fabric like outside surface. In particular nonwoven fabric laminates with elastic materials are contemplated as oblong substrates useful

in the present invention. The elasticity can be provided before or after the oblong substrate is joined to the diaper portion. If the elasticity is provided after the oblong substrate (30) is joined to the diaper portion (17), which is preferred for manufacturing reasons this can be done by thermal or mechanical activation. Thermal activation uses radiative or convective heating of a nonwoven laminate substrate of which one layer comprises a polymer which shrinks in one or both directions at elevated temperature such that the laminate as a whole contracts. This laminate will allow elastic deformation from its retracted dimension to its original dimension.

Similar but even preferred is when the activation is provided by mechanically stretching, the circular waist band which is to be elasticated at least during a short period. This can be done by use of so called ring rolling which is well known in the art. The region to be elasticated comprises at least one elastic layer of e.g. natural or artificial rubber type polymer and additional layers of polymer film or nonwovens. In the ring rolling process the additional non-elastic layers are permanently stretched while the elastic layer is elastically extended. The elastic layer preferably is sandwiched between the non elastic layers and this laminate is joined in discreet places. Hereby after being ring rolled the laminate provides an elastic region of no strain in its relaxed state. Maximum elongation is equivalent to the activation stretch length during ring rolling. Alternatively, mesh type elastic substrates e.g. with hydro entangled nonwoven fabrics, so called scrim material can be used to provide an oblong substrate particularly useful in the present invention.

A preferred characteristic of the material of the oblong substrate should be the ability to form autogenous bonds in combination with other thermo plastic material or as a combination of identical thermo plastic material to join the oblong substrate to the diaper portion. When using autogenous bonding to join the oblong substrate to the diaper portion instead of adhesive bonding, it is preferred to employ

ultrasonic or deformation welding and preferably crimping (high speed deformating welding)

As indicated above the oblong substrate can be an elastic liminate comprising a nonwoven fibrous substrate such that the nonwoven fibres provide the loop surface of the releasable closure system in combination with hook patches discussed above. The elasticity should be such that it provides a comfortable but sufficiently stable placement on a wearer. In this respect it is preferred that the elongation of the endless circular waist band should be $XWZ \%$ of the original circumference of the waist band at an absolute force of WXN .

Claims :

1. A disposable absorbent article having a longitudinal direction which defines first and second longitudinal end regions and a lateral direction which defines lateral side regions and said disposable absorbent article comprising
an oblong substrate,
said oblong substrate being disposed in lateral direction in
said first longitudinal end region of said disposable
absorbent article,
said oblong substrate extending into both lateral side
regions of said disposable absorbent article,
said oblong substrate being joined to said disposable
absorbent article in each said lateral side region such that
said oblong substrate together with said first longitudinal
end region forms an endless circular waistband, and
said endless circular waistband comprises an elastic region,
said elastic region provides at least tangential elasticity
to said endless circular waistband.
2. A disposable absorbent article according to claim 1 such
that said oblong substrate is joined to said disposable
absorbent article along the lateral outside edge in
longitudinal direction of said disposable absorbent article.
3. A disposable absorbent article according to any of the
previous claims such that said oblong substrate is joined to
said disposable absorbent article by an adhesive or
autogenous bond of 3 mm to 30 mm width in lateral direction,
preferably 5 mm to 15 mm width in lateral direction.

4. A disposable absorbent article according to claim 3 such that said autogenius bond is formed by ultrasonic or deformation welding, preferably by crimping.
5. A disposable absorbent article according to any of the previous claims such that said oblong substrate is disposed along the outside edge in longitudinal direction of said first longitudinal end region of said disposable absorbent article.
6. Disposable absorbent article according to any of the previous claims such that said first longitudinal end region is the rear end region of said disposable absorbent article.
7. A disposable absorbent article according to any of the previous claims such that said oblong substrate comprises said elastic region of said endless circular waistband.
8. A disposable absorbent article according to any of the previous claims such that said oblong substrate is an elastic laminate comprising a non-woven fibrous substrate.
9. A disposable absorbent article according to any of the previous claims such that said elastic region of said endless circular waistband is activated by thermal or mechanical action after said endless circular waistband has been formed.

10. A disposable absorbent article according to any of the previous claims such that said elastic region of said endless circular waistband provides said endless circular waistband with an elongation of at least XYZ % of original circumference of said endless circular waistband at an absolute force of said YXN.

11. A disposable absorbent article according to any of the previous claims such that said disposable absorbent article further comprises cooperating closure means allowing to releasably join said oblong substrate to the second longitudinal end region.

12. A disposable absorbent article according to claim 11 such that at least one of said cooperating closure means comprises an adhesive tape.

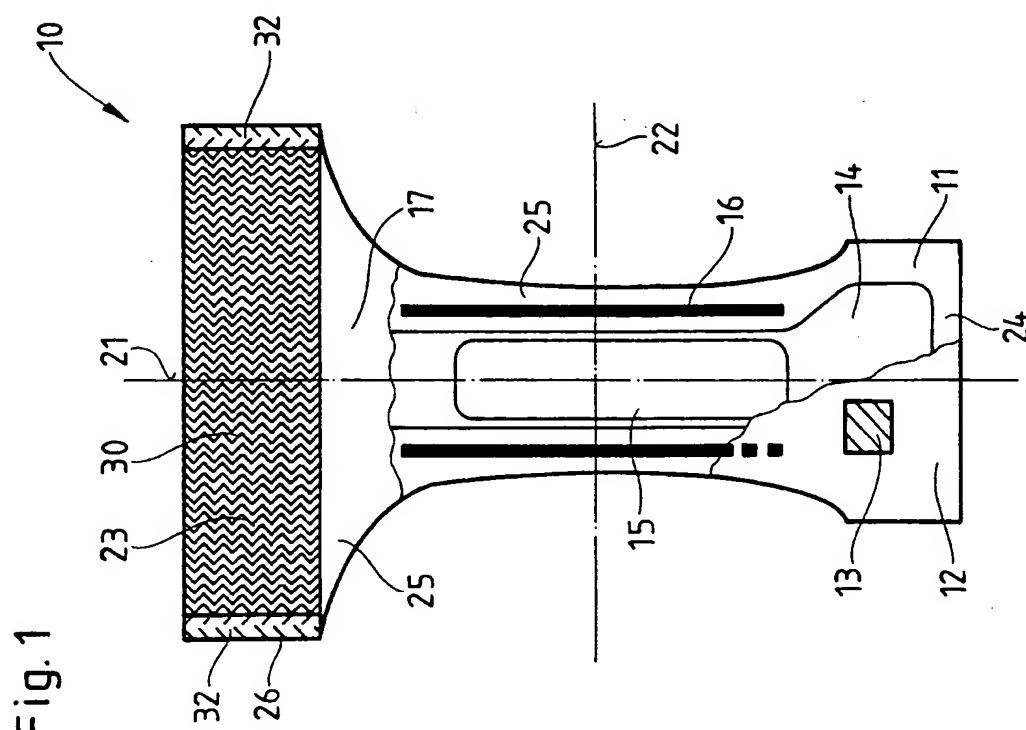
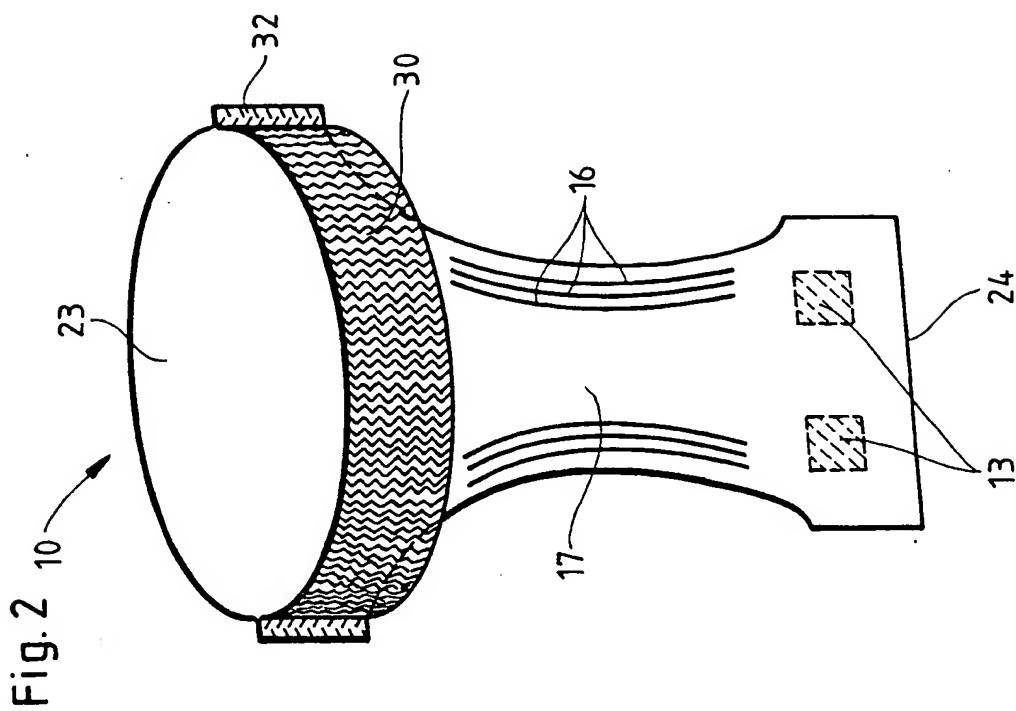
13. A disposable absorbent article according to claim 11 such that said cooperating closure means comprise mechanical attachment means.

14. A disposable absorbent article according to claim 13 such that said mechanical attachment means are of the hook-loop entanglement type.

15. A disposable absorbent article according to any of the claims 11 to 14 such that at least one of said cooperating closure means is provided on the inside of said endless circular waistband.

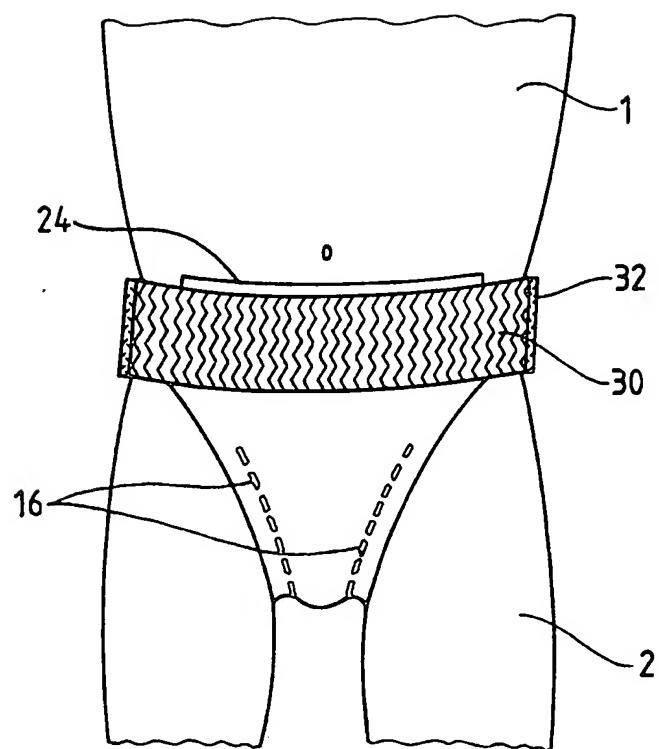
16. A disposable absorbent article according to any of the previous claims such that said disposable absorbent article is a diaper comprising a liquid pervious topsheet, a liquid impervious backsheet joined to said topsheet and an absorbent core disposed between said topsheet and said backsheet.

112



212

Fig. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/07920

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) : A61F 13/15
US CL : 604/385.2, 389, 391

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 2/400-402, 406-408, 914, 919; 604/385.1, 385.2, 389, 391-396, 500-402

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, A, 3-176053, (ZUIKO KK), 31 July 1991. See Abstract, figures, page 6 lines 14-16, page 7 line 30 to page 8 line 2, and page 11 line 33 to page 13 last line of instant specification.	1, 2, 5-7 ----- 3, 4, 8-10, 16
X	US, A, 2,701,567, (A. L. SMITH), 08 February 1955. See figures, and column 1 lines 52-74.	1, 2, 5-7, 11, 13 ----- 12, 14
Y	US, A, 4,699,622, (TOUSSANT ET AL), 13 October 1987. See column 8, lines 20-24.	12, 14
Y	US, A, 4,205,567, (REPKE ET AL.), 03 JUNE 1980. See column 15, lines 39-45.	12, 14

Further documents are listed in the continuation of Box C. See patent family annex.

• Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"*&*	document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means		
P document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 02 SEPTEMBER 1994	Date of mailing of the international search report 17 OCT 1994
--	---

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer <i>Marianne Parker</i> KAREN M. REICHLE Telephone No. (703) 308-2617
---	---